

## CLAIMS

What is claimed is:

1. A unitary portable surface cleaning apparatus, comprising:
  - a fluid dispensing system including at least one fluid supply tank, a dispensing nozzle connected to the fluid supply tank through a fluid supply conduit for applying a cleaning fluid to a surface to be cleaned at a predetermined rate;
  - 5 a fluid recovery tank for holding recovered fluid;
  - a suction nozzle;
  - a working air conduit extending between the recovery tank and the suction nozzle;
  - and
  - a vacuum source in fluid communication with the recovery tank for generating a
  - 10 flow of working air from the suction nozzle through the working air conduit and to the recovery tank to thereby recover fluid from the surface to be cleaned through the suction nozzle and working air conduit and into the recovery tank;
  - a heater exchanger, including a heater element, associated with the fluid supply conduit for heating the cleaning fluid in the fluid supply conduit to be applied to
  - 15 the surface to be cleaned;
  - the improvement which comprises:
    - the heat exchanger includes a heat storage body for storing heat energy from the heater element, and wherein the heater element and the heat storage body are designed to heat the cleaning fluid in the fluid supply conduit to a predetermined
    - 20 temperature range to the extent that the cleaning fluid flows intermittently through the fluid supply conduit but not to the extent that the cleaning fluid flows continuously through the fluid supply conduit at the predetermined rate;
    - whereby the heater exchanger is designed to store heat energy during dry cycles so that there is sufficient heat energy to heat the cleaning fluid to a predetermined
    - 25 temperature range during a wet cycle when the cleaning fluid is flowing at the predetermined rate.

2. A portable surface cleaning apparatus according to claim 1 wherein the predetermined temperature range is 130 to 180° F.

3. A portable surface cleaning apparatus according to claim 2 and further comprising a temperature sensor for sensing the temperature of the heat storage body and for controlling the heater element to maintain the temperature of the heat storage body in the range of 150 to 180° F.

4. A portable surface cleaning apparatus according to claim 1 wherein the heat exchanger is designed to elevate the temperature of the cleaning fluid at least 15 degrees Fahrenheit at a rate of approximately 850 milliliters per minute.

5. A portable surface cleaning apparatus according to claim 4 wherein the heat exchanger is designed to elevate the temperature of the cleaning fluid approximately 16 degrees Fahrenheit at a rate of approximately 850 milliliters per minute

6. A portable surface cleaning apparatus according to claim 1 wherein the heater element is an electrical heating element.

7. A portable surface cleaning apparatus according to claim 6 wherein the heater element and the vacuum source are connected to a common electrical input and are adapted to be powered by a common power source.

8. A portable surface cleaning apparatus according to claim 7 wherein the power source is a standard 120 volt line.

9. A portable surface cleaning apparatus according to claim 7 wherein the heat exchanger includes a serpentine conduit formed therein and connected to the fluid supply conduit for conducting cleaning fluid through the heat exchanger.

10. A portable surface cleaning apparatus according to claim 9 wherein the electrical heating element and the size of the heat storage body are selected to elevate the

temperature of the cleaning fluid within the heat exchanger from room temperature to a temperature in the range of 130 to 200 degrees Fahrenheit within 30 seconds.

11. A portable surface cleaning apparatus according to claim 9 wherein the electrical heating element and the size of the heat storage body are selected to elevate the cleaning fluid within the block heater from room temperature to a temperature in the range of 150 to 180 degrees Fahrenheit within 20 seconds.

12. A portable surface cleaning apparatus according to claim 11 and further comprising a temperature sensor for sensing the temperature of the heat storage body and for controlling the electrical heating element to maintain the temperature of the cleaning fluid within the heat storage body in the range of 150 to 180 degrees Fahrenheit.

13. A portable surface cleaning apparatus according to claim 6 wherein the electrical heating element and the size of the heat storage body are selected to elevate the cleaning fluid within the fluid supply conduit at least 30 degrees to a temperature in the range of 150 to 180 degrees Fahrenheit within a relatively short period of time, the  
5 electrical heating element and the vacuum source are connected to a common electrical input and are adapted to be powered by a common power source common 120 volt power source.

14. A portable surface cleaning apparatus according to claim 13 wherein the relatively short period of time is within 20 seconds.

15. A portable surface cleaning apparatus according to claim 1 wherein the fluid dispensing system includes a valve having an inlet connected to the at least one fluid supply tank and a pair of outlets, a first fluid tube and a second fluid tube are connected to the valve outlets, the valve is adapted to selectively control the flow of cleaning fluid  
5 from the at least one fluid supply tank to the first and second fluid tubes, and the heater element is connected to the first fluid tube, whereby the valve can selectively direct heated or unheated cleaning fluid, or a combination thereof, to the surface to be cleaned.

16. A portable surface cleaning apparatus according to claim 1 wherein the fluid dispensing system further comprises a pump to deliver the cleaning fluid to the surface to be cleaned at the predetermined rate.

17. A unitary portable surface cleaning apparatus, comprising:  
a fluid dispensing system including at least one fluid supply tank, a dispensing nozzle connected to the fluid supply tank through a fluid supply conduit for applying a cleaning fluid to a surface to be cleaned at a predetermined rate;  
5 a fluid recovery tank for holding recovered fluid;  
a suction nozzle;  
a working air conduit extending between the recovery tank and the suction nozzle;  
a vacuum source in fluid communication with the recovery tank for  
10 generating a flow of working air from the suction nozzle through the working air conduit and to the recovery tank to thereby recover fluid from the surface to be cleaned through the suction nozzle and working air conduit and into the recovery tank; and  
a heater exchanger, including an electrical heating element, associated with the fluid supply conduit for heating the cleaning fluid in the fluid supply conduit to  
15 be applied to the surface to be cleaned and a heat storage body for storing heat energy from the electrical heating element; wherein the electrical heating element is adapted to continuously supply at least about 500 watts of power from an ordinary 120 volt line.

18. A unitary portable surface cleaning apparatus according to claim 17 wherein the electrical heating element and the vacuum source are connected to a common electrical input and are both adapted to be powered by a common 120 volt power source.

19. A portable surface cleaning apparatus according to claim 17 wherein the fluid dispensing system further comprises a pump to deliver the cleaning fluid to the surface to be cleaned at the predetermined rate.

20. A unitary portable surface cleaning apparatus, comprising:
- a fluid dispensing system including at least one fluid supply tank, a dispensing nozzle connected to the fluid supply tank through a fluid supply conduit for applying a cleaning fluid to a surface to be cleaned at a predetermined rate;
  - 5 a fluid recovery tank for holding recovered fluid;
  - a suction nozzle;
  - a working air conduit extending between the recovery tank and the suction nozzle;
  - a vacuum source in fluid communication with the recovery tank for
  - 10 generating a flow of working air from the suction nozzle through the working air conduit and to the recovery tank to thereby recover fluid from the surface to be cleaned through the suction nozzle and working air conduit and into the recovery tank; and
  - a heater exchanger, including an electrical heating element, associated with the fluid supply conduit for heating the cleaning fluid in the fluid supply conduit to
  - 15 be applied to the surface to be cleaned and a heat storage body for storing heat energy from the electrical heating element; wherein the electrical heating element is adapted to continuously supply up to about 10,000 joules of energy to the heat storage body in about 30 seconds or less.

21. A unitary portable surface cleaning apparatus according to claim 20 wherein the electrical heating element is adapted to continuously supply deliver up to 10,000 joules of energy to the heat storage body in about 20 seconds.

22. A unitary portable surface cleaning apparatus, comprising:
- a fluid dispensing system including at least one fluid supply tank, a dispensing nozzle connected to the fluid supply tank through a fluid supply conduit for applying a cleaning fluid to a surface to be cleaned a predetermined rate;
  - 5 a fluid recovery tank for holding recovered fluid;
  - a suction nozzle;

a working air conduit extending between the recovery tank and the suction nozzle;

- 10 a vacuum source in fluid communication with the recovery tank for generating a flow of working air from the suction nozzle through the working air conduit and to the recovery tank to thereby recover fluid from the surface to be cleaned through the suction nozzle and working air conduit and into the recovery tank; and

- 15 a heater exchanger, including an electrical heating element, associated with the fluid supply conduit for heating the cleaning fluid in the fluid supply conduit to be applied to the surface to be cleaned to a temperature and a heat storage body for storing heat energy from the electrical heating element; wherein the electrical heating element and the size of the heat storage body are selected to elevate the cleaning fluid within the fluid supply conduit at least 30 degrees within 30 seconds or less, the electrical heating element and the vacuum source are connected to a common electrical input and  
20 are adapted to be powered by a common power source common 120 volt power source.

23. A portable surface cleaning apparatus according to claim 22 wherein the electrical heating element and the size of the heat storage body are selected to elevate the cleaning fluid within the fluid supply conduit to a temperature in the range of 150 to 180 degrees Fahrenheit.

24. A portable surface cleaning apparatus according to claim 22 wherein the cleaning module is a canister.

25. A portable surface cleaning apparatus according to claim 24 and further comprising a wand and wherein the suction nozzle is mounted to one end of the wand and the wand defines in part the working air conduit.

26. A portable surface cleaning apparatus according to claim 22 wherein the fluid dispensing system further comprises a pump to deliver the cleaning fluid to the surface to be cleaned at the predetermined rate.